In the claims:

1. (Currently amended) an adhesive bond between

A substrate material having a surface and a solid region proximate to the surface comprised of polymer compounds with a low active surface energy, and ~~another~~ a second material, wherein

a nano-structured transition region comprising nano-composites is formed between the substrate material and the ~~other~~ second material in such a way that ~~this~~ the transition region has a layer thickness between 20 nm and 20 µm and is predominantly formed of nano-composites, and wherein

a ratio of substrate material to the ~~other~~ second material in a direction transverse to the transition region changes from predominantly substrate material in ~~the~~ an immediate vicinity of the substrate material to predominantly the ~~other~~ second material in ~~the~~ an immediate vicinity of the ~~other~~ second material, with the substrate material transitioning into the ~~other~~ second material with a nano-structure.

2. (Currently amended) The adhesive bond according to claim 1,

wherein the transition region comprises metal fractions or metal compounds in form of nano composites containing metal polymers.

3. (Currently amended) The adhesive bond according to claim 1,

wherein the transition region comprises diamond-like components.

4. (Currently amended) The adhesive bond according to claim 1,

wherein the transition region comprises nano-composites containing fluoropolymers.

Claims 5 - 9 (Canceled).

10. (currently amended) A composite structure comprising

a substrate material of a first composition having a surface and a solid region proximate to the surface comprised of a polymer compound with a low active surface energy,

~~another~~ a second material of a second composition disposed on the solid region of the substrate, and

a nano-structured transition region formed between the solid region of the substrate and the ~~other~~ second material, said nano-structured transition region having a layer thickness between 20 nm and 20 μm and comprising predominantly nano-composites,

wherein a composition of the nano-composites changes from a composition substantially identical to that of the substrate material proximate to the substrate material to a composition substantially identical to that of the ~~other~~ second material proximate to the ~~other~~ second material.

11. (previously presented) The composite structure of claim 10, wherein the nano-composites comprise metal fractions or metal compounds, or both.

12. (previously presented) The composite structure of claim 10, wherein the nano-composites comprise metal polymers.

13. (previously presented) The composite structure of claim 10, wherein the nano-composites have a diamond structure.

14. (previously presented) The composite structure of claim 10, wherein the nano-composites comprise α-C:H.

15. (previously presented) The composite structure of claim 10, wherein the nano-composites comprise fluoropolymers.

16. (Withdrawn, amended) A method for producing an adhesive bond between a substrate

material having a surface and a solid region proximate to the surface which includes polymer compounds with a low active surface energy, and ~~another~~ a second material, comprising the steps of:

nano-indenting a solid region of the substrate material proximate to the surface having the polymer compounds with a low active surface energy to form a nano-indented surface,

activating the nano-indented surface by an excitation process which excites molecules of the polymer compounds, and

depositing the ~~other~~ second material on the activated nano-indented surface particle-by-particle by a physical vapor deposition (PVD), by a chemical vapor deposition (CVD) process or by cathode sputtering, or by a combination thereof, while the polymer molecules are still in an energetically excited state, until the solid region proximate to the surface of the substrate material is completely covered with the ~~other~~ second material.

17. (Withdrawn) The method of claim 16, wherein the excitations process comprises a process selected from the group consisting of ion bombardment, ion beam processing, plasma processing, electron beam processing and laser beam processing.

18. (Withdrawn, amended) The method of claim 16, wherein the ~~other~~ second material is deposited concurrently with activating the nano-indented surface.

19. (Withdrawn, amended) The method of claim 16, wherein the ~~other~~ second material is deposited in parallel with activating the nano-indented surface.

20. (Withdrawn) The method of claim 16, wherein nano-indenting the solid region of the substrate material proximate to the surface is performed in a separate process.

21. (Withdrawn, amended) The method of claim 16, wherein depositing the ~~other~~ second material starts with a low deposition rate, with the deposition rate increasing continuously or

step-wise until the ~~other~~ second material completely covers the solid region proximate to the surface of the substrate material.

22. (Withdrawn, amended) The method of claim 16, wherein the ~~other~~ second material is a non-metallic material, the method further comprising the step of depositing metal fractions on the activated nano-indented surface at least during a first phase of the particle-by-particle deposition of the ~~other~~ second material.

23. (Withdrawn, amended) The method of claim 16, wherein the nano-indented surface is activated in a vacuum and the ~~other~~ second material is also deposited particle-by-particle in a vacuum.

24. (Withdrawn) The method of claim 23, wherein the vacuum has a pressure between approximately $1x10^{-1}$ mbar and $1x10^{-5}$ mbar.

25. (Withdrawn) The adhesive bond of claim 1, wherein the transition region comprises metal polymers.

26. (Withdrawn) The adhesive bond of claim 1, wherein the transition region comprises nano-composites containing α-C:H.